CLAIMS

1. Multiplier arrangement (MUXER) including a pair of input terminals (inmux1,inmux2) to which analog phase information is provided, said multiplier arrangement (MUXER) being further adapted to receive a set of high-frequency local oscillator signals (LO1, LO2, LO3, LO4) which are 90 degrees in phase shifted with respect to each other, said multiplier arrangement (MUXER) being adapted to generate from said analog phase information and from said high-frequency local oscillator signals (LO1,LO2,LO3,LO4), components of a high-frequency phase vector (PV), and to synthesise said high-frequency phase vector (PV) from said components within a summing means (SUM) of said multiplier arrangement,

characterised in that

said multiplier arrangement (MUXER) is further adapted to provide said high-frequency phase vector (PV) as a vector which is making an excursion alongside the contours of a square within the complex plane during a first category of predetermined transitions of a phase signal (φ) on which said analog phase information is dependent.

2. Multiplier arrangement (MUXER) according to claim 1

characterised in that

said multiplier arrangement (MUXER) is further adapted to provide said high-frequency phase vector (PV) as a vector which is making an excursion alongside the diagonals of said square during a second category of predetermined transitions of said phase signal (φ) which is different from said first category .

3. Multiplier arrangement (MUXER) according to claim 1 or claim 2

characterised in that

said multiplier arrangement (MUXER) is further adapted to receive a set of differential high frequency local oscillator signals (LO1-LO3,LO2-LO4,LO3-LO1,LO4-LO2),

said multiplier arrangement (MUXER) thereby includes a pair of output terminals (outmux1,outmux2) on which said high-frequency phase vector (PV) is provided as a differential high-frequency phase vector.

4. Multiplier arrangement (MUXER) according to claim 3
characterised in that
said multiplier arrangement includes a plurality of multipliers (M1,M2,M3,M4), each multiplier (M1,M2,M3,M4) of said plurality having a respective input terminal (inm1,inm2,inm3,inm4) which is coupled to a first terminal of an associated switch (SW1,SW2,SW3,SW4), a second terminal of said associated switch being coupled to one of said pair of input terminals (inmux1,inmux2) of said multiplier arrangement or to the ground reference terminal under control of a respective control signal (c1,c2,c3,c4), said multiplier arrangement thereby includes a set of control input terminals to which said respective control signals are provided.

5. Multiplier arrangement (MUXER) according to claim 4
characterised in that
said multipliers (M1,M2,M3,M4) of said plurality of multipliers are adapted to deliver respective ones of said components of said high-frequency phase vector (PV).

6. Multiplier arrangement (MUXER) according to claim 4
characterised in that
a multiplier (M1) of said plurality includes a differential pair of transistors (T11,T12),

- respective control terminals of said transistors are adapted to receive respective components of a differential high-frequency local oscillator signal of said set of differential high-frequency local oscillator signals,
- respective first conductive terminals of said transistors of said differential pair are coupled to the output terminal of a transconductor

circuit (TC) of which an input terminal is coupled to said respective input terminal (inm1) of said multiplier (M1),

- respective second conductive terminals of said transistors of said differential pair being coupled to input terminals of said summing means (SUM).

7. Multiplier arrangement (MUXER) according to claim 6 characterised in that

said transconductor circuit (TC) includes a transistor (T13), a control terminal of which is coupled to said input terminal of said transconductor circuit, a first conductive terminal of which is coupled to the ground reference terminal via an impedance device (R1), a second conductive terminal of which is coupled to said output terminal of said transconductor circuit.

8. Signal modulator (SM) adapted to generate a high-frequency output signal from analog phase information, said signal modulator including

- a pair of input terminals (SM1, SM2) to which said analog phase information is provided ,

- a quadrature generator (QG) adapted to generate a set of high-frequency local oscillator signals (LO1,LO2,LO3,LO4), which are 90 degrees in phase shifted with respect to each other,

- a multiplier arrangement (MUXER) adapted to receive said analog phase information and said set of high-frequency local oscillator signals and to generate from it a high-frequency phase vector (PV),

characterised in that

- said multiplier arrangement is further adapted in accordance to any of the claims 1 to 3

- said signal modulator further includes an envelope limiter (EL) adapted to transform said high-frequency phase vector into said high-frequency output signal .

9. Signal modulator (SM) according to claims 4 and 8
characterised in that
said signal modulator (SM) includes a control circuit (CC) adapted to receive said phase signal (φ) and to derive therefrom said respective control signals (c1,c2,c3,c4) for provision to said multiplier arrangement.

10. Multiplier arrangement (MUXER) according to claim 9
characterised in that
said control circuit (CC) is further adapted to generate said respective control signals such that at most two of said multipliers of said plurality of multipliers are coupled to a respective one of said pair of input terminals (inmux1,inmux2) of said multiplier arrangement (MUXER).

11. Signal modulator (SM) according to claim 10
characterised in that
said envelope limiter (EL) includes another differential pair of transistors (Te1,Te2),

- respective control terminals of which are coupled to said pair of output terminals (outmux1,outmux2) of said multiplier arrangement (MUXER),
- respective first conductive terminals of which are coupled to the output terminal of a bias circuit (BC),
- respective second conductive terminals of which are coupled to a pair of differential output terminals (outel1,outel2) of said envelope limiter (EL) and being coupled to the supply voltage terminal (Vcc) via respective impedance devices (R7,R8).

12. Transmitter (TX) including
- a transmit data source adapted to deliver transmit data to

- a phase accumulator (PAC) of said transmitter (TX) , said phase accumulator (PAC) being adapted to determine from said transmit data a phase signal (φ) for delivery to

- an analog pulse shaper (BAP) of said transmitter (TX), said analog pulse shaper being adapted to generate from said phase signal (φ) analog phase information for delivery to

- a signal modulator (SM) of said transmitter being adapted to generate a high-frequency output signal from said analog phase information for delivery to

- a power amplifier (PA) of said transmitter being adapted to amplify said high-frequency output signal for further transmission to a receiver

characterised in that

- said analog pulse shaper is further adapted to generate said analog phase information as two balanced analog signals (B,$\underline{B}$),

- said signal modulator is further adapted in accordance to any of the claims 9 to 11.

13. Transmitter according to claim 12

characterised in that

said analog pulse shaper (BAP) includes a read-only memory device (ROMm) coupled to a digital-analog converter (DAC).

MULTIPLIER ARRANGEMENT, SIGNAL MODULATOR AND TRANSMITTER

A multiplier arrangement (MUXER) is adapted to generate from analog phase information and from high-frequency local oscillator signals, components of a high-frequency phase vector (PV), and to synthesise said high-frequency phase vector (PV) from said components within a summing means is further adapted to provide said high-frequency phase vector (PV) as a vector which is making an excursion alongside the contours of a square within the complex plane during a first category of predetermined transitions of a phase signal (φ) on which said analog phase information is dependent. A signal modulator including such a multiplier arrangement as well as a transmitter are described as well.